

**ARTICLE COMPRISING AN OXIDE LAYER ON A GaAs-BASED  
SEMICONDUCTOR STRUCTURE AND METHOD  
OF FORMING SAME**

5

**Abstract**

A compound semiconductor structure is provided, which includes a GaAs-based supporting semiconductor structure having a surface on which a dielectric material is to be formed. A first layer of gallium oxide is located on the surface of the supporting 10 semiconductor structure to form an interface therewith. A second layer of a Ga-Gd oxide is disposed on the first layer. The GaAs-based supporting semiconductor structure may be a GaAs-based heterostructure such as an at least partially completed semiconductor device (e.g., a metal-oxide field effect transistor, a heterojunction bipolar transistor, or a semiconductor laser). . In this manner a dielectric layer structure is provided which has 15 both a low defect density at the oxide-GaAs interface and a low oxide leakage current density because the dielectric structure is formed from a layer of  $\text{Ga}_2\text{O}_3$  followed by a layer of Ga-Gd-oxide. The  $\text{Ga}_2\text{O}_3$  layer is used to form a high quality interface with the GaAs-based supporting semiconductor structure while the Ga-Gd-oxide provides a low oxide leakage current density.

20